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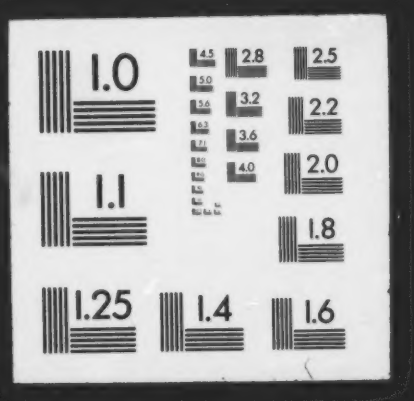

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Waste Reduction Assistance Program (WRAP) On-Site Consultation Audit Report: Automobile Body Repair and Paint Shop

Alaska Health Project, Anchorage

Prepared for:

Environmental Protection Agency, Seattle, WA

14 Aug 87

U.S. Department of Commerce
National Technical Information Service
NTIS

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Alaska Health Project

WASTE REDUCTION ASSISTANCE PROGRAM (WRAP)

ON-SITE CONSULTATION AUDIT REPORT: AUTOMOBILE BODY REPAIR AND PAINT SHOP

REPRODUCED BY
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16. Abstract (Limit: 200 words)

This study reports on one Alaskan automobile body repair and paint shop. The study makes numerous recommendations for the reduction of hazardous waste for this shop and for others throughout the industry, including advice on reducing overspray, inventory controls, worker training, waste recycling, and good housekeeping practices.

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READERS NOTE:

The information contained herein is intended to be general guidance for the facility described in this report and the industry as a whole. It is the product of approximately 6 to 8 hours of on-site consultation. The focus of the report is waste management and waste reduction, not regulatory compliance. Regulatory issues mentioned herein are discussed only insofar as they impinge on management issues related to hazardous waste management and waste reduction, and are not part of a comprehensive discussion about all pertinent regulation requirements. Waste determinations were made from available data, no on-site sampling took place. Managers interested in specific information on hazardous waste regulations should contact the nearest EPA or Department of Environmental Conservation office. Waste reduction measures are described briefly and should be further evaluated and balanced against unique conditions of each specific business.

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I. Introduction

A. The Waste Reduction Assistance Program (WRAP).

In 1986, the United States Environmental Protection Agency (EPA) awarded a RCRA 8001 grant to the Alaska Health Project, a private non-profit organization located in Anchorage, Alaska. The grant was awarded to develop and deliver a pilot project to assist Alaska's Small Quantity Generators (SQGs) in complying with new Small Quantity Generator regulations. The project, the Waste Reduction Assistance Program (WRAP) has two principal goals:

1. To conduct outreach and education activities to support EPA's Small Business Initiative to achieve Small Quantity Generator compliance with new hazardous waste regulations.

2. To conduct on-site audits to investigate hazardous waste management practices and processes for specific SQG's categories.

WRAP on-site consultation audits are conducted with the understanding that the identity of selected SQGs remain confidential and that all audit reports contain no specific facility identifiers. Audit results and recommendations are intended to be widely applicable to other SQGs in Alaska. Audit reports are available to interested parties upon request.

This report is the product of conducting an environmental audit of an Alaskan autobody shop. The report goals are to:

1) Analyze a typical autobody shop in Alaska and publish the findings in a report.

2) Provide a format, by making available this report, to other autobody shops and businesses to conduct their own environmental audit.

3) Identify the hazardous wastes produced in the autobody shops and the processes by which they are generated.

4) Make recommendations, if appropriate, to reduce the amount of hazardous wastes generated.

5) Identify common waste management practices and advise on possible better methods to store and ship hazardous wastes.

6) Analyze the cost benefits of the waste reduction methods recommended in this report.

All recommendations, information, and cost data are subject to change. They will not reflect future market conditions, regulatory climate, and changes in shop processes. This report offers only general guidance to other small quantity generators and all the information provided should be balanced against the unique conditions of each specific business. It should be pointed out that the regulatory interpretations made in this report have not been sanctioned by the EPA. Therefore, generators should contact the EPA in order to determine their specific regulatory requirements.

B. Audit Methods.

The audit team consisted of an environmental scientist and an environmental health specialist. The audit comprised two main steps:

1) Interview and data collection.
2) Shop walkthrough.

Step one consisted of an interview with the shop manager. The interview was designed to collect the following information:

1) General shop information (size, operation, etc.).

2) Shop processes.

3) Material safety data sheets.

4) Current waste management practices.

The interview was also designed to provide the shop manager with a detailed description of the audit process.

In step two, the audit team and the shop manager conducted a visual inspection of the shop operations and processes. The audit team identified the processes generating potential hazardous wastes and investigated current waste management practices.

The approximately 6 hours of on-site consultation included no environmental sampling or industrial hygiene monitoring. All the information provided in this report is based on the interview, the walkthrough, and a review of the current and available literature. Hazardous waste determinations were based upon a review of material safety and data sheets, any existing laboratory reports, and EPA literature. Waste volume figures are based upon estimates made by the generator and the audit team during the shop walkthrough.

II. Shop Description and Autobody Repair Process

The autobody shop considered in this audit is fairly large by Alaskan standards. The shop employs a staff of approximately 6 people and has a surface area of 5,750 square feet. Depending on the amount of damage each vehicle has, anywhere from 40 to 60 vehicles are repaired per month. Figure II.1 is a floor plan of the autobody shop. The processes involved in the repair of a vehicle include washing the vehicle; removing dents; and priming, sealing, and painting the vehicle.

When a vehicle is brought into the shop for repair, it is first washed using an harsh detergent. Parts that do not require any painting, such as door handles, molding, and bumpers, are removed. Body damage is repaired by pulling out dents and patching various areas. Holes are drilled into the panels, a slide hammer is screwed into the holes, and the dents are pulled out. The holes are then filled with a body filler (bondo). The filled area is ground smooth, down to the bare metal. The area around the bare metal is "feathered" with a sander and a degreaser is applied in preparation for the primer application. Three coats of primer are sprayed, using an air gun; on the area. The primer must be allowed to dry for approximately 8 hours before any paint is applied.

Once the primer is dried, the repaired area is sanded to remove any scratches from the primer. The vehicle is then washed and taken into a paint booth. Before any painting begins, the vehicle is taped and masked. Next the vehicle is sprayed with a sealer. The sealer allows the new paint to adhere to the old paint. After the sealer has dried for 20 minutes, the vehicle is dusted with an air gun and a cloth. Three coats of paint are then sprayed on the vehicle.

This shop, unlike many other shops, is equipped with a paint mixing room. The room is a totally enclosed fire and explosion containment room. This facility allows an employee to mix various volumes of paint as needed, reducing the volume of excess paint generated. It also enables the employee to obtain a variety of shades and colors in the paints, thus providing a better match to the original color of paint that is on the vehicle.

After the paint has dried for 4 to 6 hours, all tape and masking paper is removed and disposed of as solid waste. The molding, mirrors, and other parts are then put back on the vehicle. The refinished vehicle is then washed with a mild soap and the job is complete.

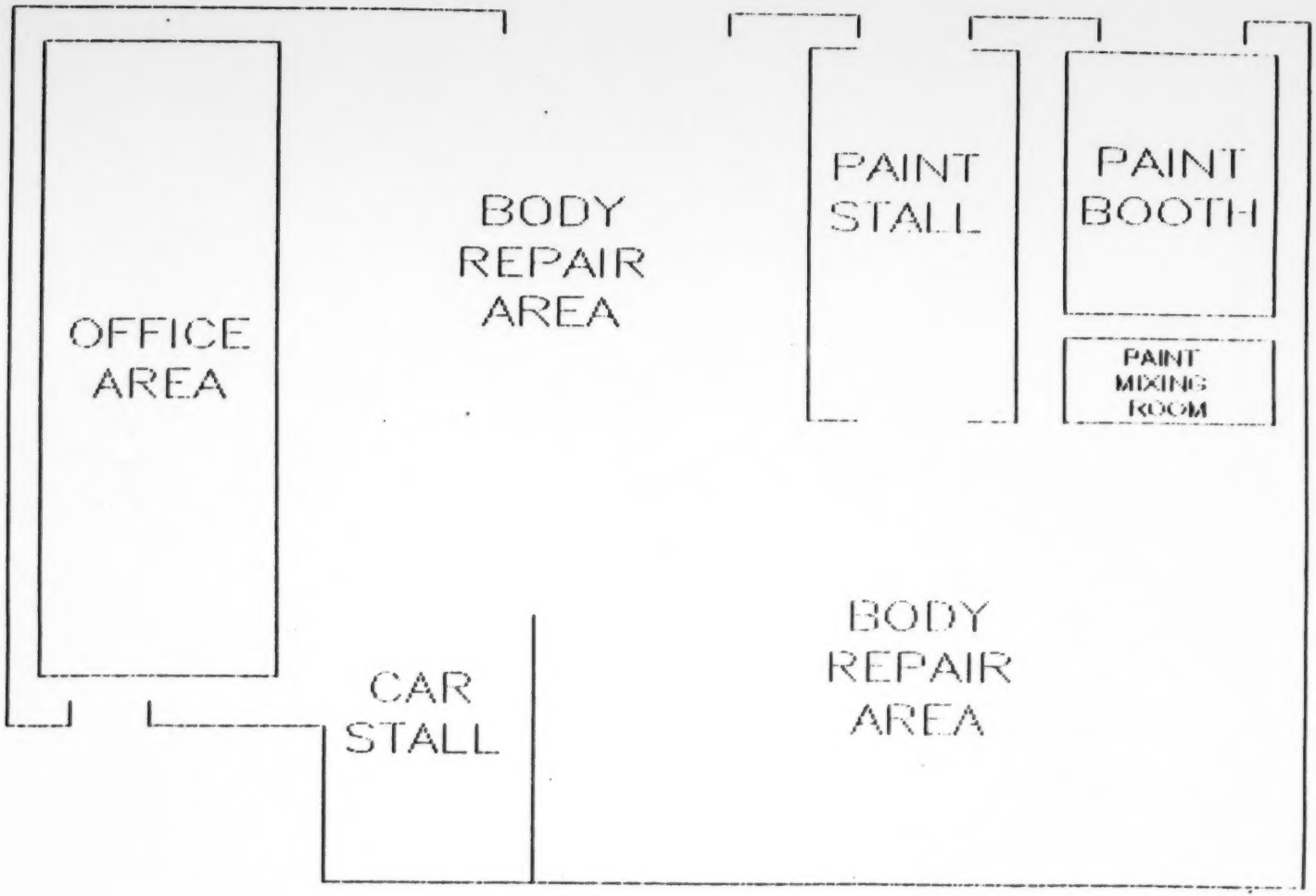

Figure II.1 SHOP DIAGRAM

Reproduced from best available copy.

III. Waste Generation

A. Waste Generation by Process.

The wastes produced by the autobody shop are described in this section. Table III.1 shows the type and quantity of wastes generated by the various operations. The type and quantity of wastes generated were determined from an interview with the body shop manager, from available Material Safety and Data Sheets (MSDS), and from the literature. No sampling was performed.

Table III.1
Types of Potential Hazardous Waste Generated

Process	Waste Type	Quantity
Body Repair	Sanding dusts, Sand paper, Excess body filler	Unknown
Painting	Waste paint-thinner mixture,	165 gallons/year
	Masking tape and paper,	Unknown
	Soiled air filters	20 filters/month

Body Repair

Wastes generated during the body repair operations include sanding dusts, used sand paper, and any excess body fillers. Sanding dusts collect on the floor and are swept up and deposited into refuse dumpsters. Small amounts of the dusts are washed into floor drains during routine cleaning operations. The floor drains empty into a holding tank that is pumped by a local waste water hauler. Used sand paper and excess body fillers are also deposited in refuse dumpsters.

Painting

Wastes generated during the painting operations include masking tape, masking paper, and paint cans laden with primer and paint, waste paint, paint-thinner mixture generated from cleaning paint guns, and soiled air filters from the ventilation system in the paint booth. The tape and paper used to mask the vehicle and the empty paint cans are not considered hazardous wastes and are disposed of in refuse dumpsters. The paint booth has 20 filters which are changed monthly and are also deposited in the refuse dumpsters.

Occasionally a small volume of paint is left over after the painting job is completed. This paint is either stored for use on touch-up jobs or is poured into the waste solvent bucket.

After each painting job is complete, the paint guns must be washed immediately with new, clean thinner. A small amount of thinner is sprayed through the gun and then emptied into the waste solvent bucket. The gun cleaning process generates the greatest volume of the waste paint-thinner mixture. The autobody repair shop discussed in this audit generated 165 gallons (three drums) of waste paint-thinner mixture this past year.

B. Regulated Wastes

The waste paint-thinner mixture is the principal hazardous waste generated at automobile repair shops. Table III.2 gives various classifications for the paint-thinner mixture. The waste mixture generated by the shop discussed in this audit is classified as an ignitable hazardous waste and has a hazardous waste number of D001. The waste mixture is classified as ignitable if it has a flash point below 140 degrees F.

Table III.2
Classification of Autobody Repair Wastes

Waste Type	Classification	Hazardous Waste Number
Paint-thinner mixture	Ignitable	D001
Spent halogenated solvent	Listed hazardous waste	F002
Spent non-halogenated solvent	Listed hazardous waste	F003

The type of waste generated at each automotive body repair and painting shop will vary depending upon the products used. The majority of products utilized in these operations do exhibit the ignitable characteristic and are classified as such. The information supplied in this section was obtained from 40 CFR Part 261.

IV. Waste Management

A. Waste Storage

A small quantity generator may not store hazardous wastes in quantities greater than 13,200 pounds for longer than 180 days. The waste may be stored for 270 days if it has to be transported over 200 miles to a licensed hazardous waste facility. This case applies to Alaska, which has no approved hazardous waste disposal facility. Generators of less than 220 pounds per month of hazardous wastes are subject to the Small Quantity Generator Regulations if they store more than 2,200 pounds of hazardous wastes.

Hazardous wastes containers should be clearly labeled "hazardous wastes". The containers should also be marked with the date the collection of the wastes began. The containers should be kept in good condition, closed, and inspected once per week. The wastes, if ignitable or reactive, should be placed as far as possible from the storage's property line. The wastes may be treated on-site without a permit if:

a) They are treated within 180 days (in Alaska, 270 days).

b) The containers conform to the regulation described in the above paragraph.

c) Steps are taken to prepare for and prevent accidents as described in the Small Quantity Generator Regulations.

Precautions should be taken to prevent accidents involving the hazardous materials stored on site. The regulations for the storage of hazardous materials and wastes were written to prevent accidental spills, fires, explosions, and release to the environment. The operator of a site should develop a contingency plan to deal with an accident involving the hazardous wastes being stored. The operator also should train employees to assure proper handling and storage of any hazardous substances and to assure employees are aware of the appropriate emergency procedures.

B. Waste Disposal Methods

Waste Paint-Thinner Mixture

The waste mixture is classified as either spent solvent, which is listed as a hazardous waste under 40 CFR 261.31, or an ignitable hazardous waste. Therefore, this mixture must be disposed of in accordance with the EPA and DOT regulations.

Generally, there are three acceptable disposal methods:

1) Disposal in a licensed hazardous waste landfill. It should be noted that there is a ban on land disposal of some solvent wastes and there will be a complete ban on land disposal of solvents as of 1988 (40 CFR Part 268).

2) Disposal in a authorized high-temperature incinerator.

3) Disposal to an authorized hazardous waste recycler.

Since none of the above facilities are available in Alaska, all wastes must be transported, out of state, to a disposal site approved by the EPA. The wastes must be shipped in containers and by haulers as prescribed by DOT. A hazardous waste hauler should be able to offer assistance in assuring adequate packaging. The packaging requirements are described in the DOT regulations (49 CFR Part 172).

C. Costs

The cost of disposing hazardous wastes can vary with the following factors:

1) Quantity and nature of the wastes.

2) Transportation distance.

3) Variations in prices charged by the haulers and disposal facilities for the transportation and disposal of the hazardous wastes.

It may be advantageous to contact other generators of hazardous wastes to coordinate shipments and realize savings through bulk shipments. Waste determination fees may be eliminated if future waste streams remain constant.

In Alaska, there are no EPA approved hazardous wastes management facilities. All hazardous wastes, as defined by RCRA, must be shipped out-of-state to an approved facility. The cost of shipping the hazardous waste increases the disposal costs considerably.

Comprehensive disposal costs for a 55-gallon drum of hazardous waste generated in Alaska can cost up to $1,390.00 (Glean Incorporated). See Table IV.1 for a cost breakdown. This estimate assumes incineration is the disposal method. If the waste is disposed of in a landfill or by recycling, costs may be reduced. However, considering the new solvent ban on land disposal inceneration of the wastes is frequently the only alternative. Also, as noted previously the cost can vary depending upon the hauler and the disposal facility.

The high disposal cost of hazardous wastes should be taken into consideration when purchasing raw materials and planning expenditures. Production processes and methods should also be analyzed to identify means of minimizing the generation of hazardous wastes and thereby disposal costs.

Table IV.1
Hazardous Waste Disposal Cost Estimate for One 55-Gallon Drum Generated in Alaska

Waste Determination (In state lab analysis)	$ 175.00
Transportation	$ 310.00
Disposal Site Profile (On site lab analysis)	$ 200.00
Waste Acceptance	$ 125.00
Incineration	$ 580.00
Total Cost	$1,390.00

V. Waste Generation Reduction Alternatives

A. Incentives

A number of incentives exist to promote hazardous wastes reduction in the private sector. Waste reduction incentives include:

1) High Disposal Costs: Land disposal restrictions outlined in the Hazardous and Solid Waste Amendments of 1984 limit the number of untreated wastes that can be disposed of on land, and impose stricter standards on surface impoundments and underground tanks. In addition, hazardous wastes management facilities are scarce in the United States. These and other factors contribute to the high disposal costs of hazardous wastes.

2) Financial Liability: Generators of hazardous wastes incur liability for their wastes from the time they are produced until the time of their ultimate disposal. This is known as the "cradle to grave" concept. The liability includes potential improper handling by the waste transporter and disposal facility. Generators also are liable for any future sudden releases of disposed wastes. The generator may be required to pay for the entire clean-up of a spill and/or waste site. Generating a smaller quantity of hazardous wastes translates into decreased financial liability.

3) Public Relations: Employing waste reduction techniques in a business can improve the public perception of the business. A favorable perception can result in better community relations and possible financial gains.

B. Waste Reduction Categories

Waste reduction techniques can be grouped into the following broad categories:

1) Process Technologies: this involves the use of technology to reduce process wastes.

2) Plant Operations: this category involves alterations in plant operations to decrease hazardous wastes generation. Better inventory control and efficient use of raw materials are examples of plant operations changes that can be made to minimize hazardous wastes production.

3) Plant Input Changes: another way to reduce hazardous wastes generation is to utilize raw materials that will not become hazardous wastes during the production

process.

4) In-Process Recycling: this process recycles potential hazardous wastes by channeling them back into the production process. Distillation of the paint-thinner mixture, as an alternative to disposal, is an example of recycling.

C. Potential Waste Reductions in the Autobody Repair and Paint Industry

Most autobody repair shops generate hazardous wastes in the form of a paint-thinner mixture. The waste reduction techniques described in the previous section can be applied to the autobody repair industry.

Process Technologies

Various process modifications can possibly reduce wastes. As mentioned previously, the shop discussed in this audit mixes their own paint. This allows the painter to mix only the amount of paint that is to be used on a particular job, reducing the amount of paint left over and therefore the amount of waste paint generated.

Paint overspray translates into an economic loss and results in the generation of more wastes. As little as 30% of the paint reaches the target during the paint spraying. The efficiency of spraying can be increased by using electrostatic spray equipment, air-atomized spray guns, or gravity feed guns. The paint cups associated with the spray guns are usually quart containers. Utilizing smaller cups would reduce waste generation by limiting over mixing of paint and by decreasing the amount of solvent needed for equipment cleanup.

Another way to reduce the generation of the waste solvent mixture would be through product substitution. The substitution of water-based paints for solvent-based paints is increasing in many paint-associated industries. Water-based paints are less hazardous and no major equipment changes are required to convert from a solvent-based to a water-based system. Cleanup of the equipment requires only water. The use of solvent-based paints requires the use of respirators in the workplace due to the high levels of solvent vapors in the air. The use of water based paints reduces occupational exposure to solvent vapors. Currently, however, few water-based paints provide a viable alternative to the auto paint industry. These products are water soluable and the development of a practical sealing method is necessary before these products can be used in this industry.

Plant Operations Changes and Plant Input Changes

Good housekeeping can greatly improve the efficiency of solvent and thinner use. Keeping lids and bungs on containers prevents the loss of chemicals through evaporation. Spillage can be reduce by utilizing spigots, pumps, and funnels when dispensing and transferring materials. Employees should be trained to carefully mix paints to the desired color and in the desired amounts. However, if paint is mixed to an off color it can be saved for another job or possibly be sold as such. Once a painting operation is complete, any left over paint can be given to the customer for touch-ups instead of being poured into the waste solvent drum.

Training the employees to handle the solvent properly decreases consumption and waste generation. Cleaning of spray guns is the major source of the waste paint-solvent mixture. Training employees to use only small amounts of solvent while cleaning equipment can reduce the amount of hazardous waste generated from 20 to 30 percent. Another way to reduce the amount of waste solvent generated is to reuse the solvent during cleaning. The spray gun may first be rinsed with used solvent and then a small amount of fresh solvent can be used to spray through the nozzle and clean out any residue.

Considering the requirements of the underground storage tank regulations, which involve costly monitoring and testing operations, storage of spent solvent in a tank is not recommended. The solvents usually are purchased in 55-gallon drums, and once labeled correctly, they will serve as acceptable containers to store and ship any spent solvent mixture.

In-Process Recycling

The in-process recycling used in autobody repair shops typically includes the use of solvent recovery units. The autobody repair shop discussed in this audit does not recycle the paint-solvent mixture they generate. Since the recovery units are operated at high temperatures, the shop owner has chosen not to purchase one for safety reasons. Also, this shop generates only a small volume of paint-solvent mixture and has not had to pay for the proper disposal of the wastes, therefore, recycling the solvent does not provide a economic incentive for him. A feasibility study of incorporating the use of a recovery system is presented in the next section.

Generators who do not possess the technical expertise or find it uneconomical to recycle solvents on site, can usually send their spent solvent to a commercial recycler. These recyclers can generally reprocess 70 to 80 percent of the spent solvent. The reclaimed solvent is often sold back to the generators. In Anchorage, there are no commercial solvent recovery operations set up to handle the solvents generated by autobody repair and paint shops.

D. Feasibility Study

The shop discussed in this audit currently is generating 3 drums of waste solvent per year. This past year the solvent was disposed of at the annual municipal spring cleanup, at no cost to the generator. Had these drums been disposed of through a hauler, costs could be as high as $1,390.00 per drum or approximately $25.00 per gallon (see Table IV.1). The disposal cost of the three drums could have been as high as $4,170.00. Once the generator must pay to dispose of the hazardous wastes generated, recycling may become an attractive alternative.

This shop consumes approximately 60 drums of solvent per year. Each drum costs $185.00, which translates into a cost of $3.40 per gallon of solvent. The cost of a small solvent recovery unit would be in the range of $5,000.00. These units are able to convert 5 gallons of waste solvent into 4.5 gallons of recycled solvent. This is a 90% recovery efficiency.

The manager of this shop estimated a 20% loss of the waste solvent due to evaporation. Therefore, if the waste was not allowed to evaporate, the shop would be accumulating not 165 gallons of waste solvent per year, but 206 gallons. Considering a 90% efficiency, approximately 186 gallons of recycled solvent could be produced. This would translate into a savings of $632.50 per year on the purchase of solvent.

In addition, considerable savings in waste disposal costs would be realized. The recovery unit would be producing wastes in the form of a still sludge. The amount of waste produced would be approximately .5 gallons per 5 gallons of waste solvent. Therefore, this shop would be producing approximately 20.5 gallons of waste per year. Using the disposal cost of $25.00 per gallon, as cited above, total disposal costs would now be $515.00 instead of $4,170.00. This is a difference of $3,655.00.

The total savings, that of the solvent cost and that of the disposal cost, add up to be $4,287.00 per year. If the initial cost of the solvent recovery unit was $5,000.00 and the cost of operating the unit is estimated to be $.10 per gallon, the pay back period would be approximately 14 months. The estimated disposal cost is very conservative and assumes the waste will be incinerated. Disposal cost can vary greatly, and changes in these costs will greatly affect the results of this feasibility study.

VI. Summary and Conclusions

The autobody shop discussed in this audit generates approximately 165 gallons of waste solvent per year. This translates into approximately 1,452 pounds per year or 121 pounds per month. Generators of fewer than 220 pounds of hazardous waste per month are conditionally exempt from the Small Quantity Generator Regulations. Conditionally exempt generators, however, must identify the hazardous wastes they produce. In addition, the hazardous wastes accumulated on site cannot exceed 2,200 pounds. Storing more than 2,200 pounds of hazardous wastes on site will subject the conditionally exempt small quantity generator to the Small Quantity Generator Regulations.

The quantity of hazardous wastes generated, by the autobody shop described in this audit, was determined with information provided by the autobody shop at the time of the audit. This autobody shop, as is generally the case with all autobody shops, produces hazardous wastes in the form of a paint-solvent mixture.

To minimize the generation of hazardous wastes, the autobody shop should:

a) Adopt production practices that will diminish the quantity of hazardous materials consumed and, therefore, reduce the quantity of hazardous wastes produced. This autobody shop mixes their own paint. Only the amount of paint that is to be used is mixed so that very little is left over and disposed of as a waste. Utilizing paint guns that reduce overspray also reduces the quantity of hazardous materials consumed and reduces the amount wasted.

b) Consider, when making capital investments, technologies that will reduce the amount of hazardous wastes generated. Substituting water-based paints for the solvent-based paints is being investigated to provide a possible alternative for autobody shops.

c) Develop tighter inventory controls to better monitor the quantity of materials used. Monitor and control the amount of solvent used by employees to clean the paint guns.

d) Provide training programs to workers to insure efficient use of materials. Train employees to carefully mix paints and use solvent sparingly when cleaning paint guns.

e) Develop good housekeeping procedures. Chemical loss through evaporation can be greatly reduced by the use of tight-fitting lids, spigots, and other appurtenant

equipment. Spillage can be reduced by utilizing spigots, pumps, and funnels when dispensing and transferring materials.

f) Recycle wastes whenever possible. There is no commercial recycler that processes waste solvent generated by autobody paint shops in Anchorage. However, the use of a solvent recovery system would reduce the amount of wastes generated.

Conducting periodic environmental audits can prove to be an excellent tool to decrease the hazardous wastes generated and to improve overall plant efficiency.

Appendix A

Synopsis of the Small Quantity Generators Regulations

Facilities producing between 220 and 2200 pounds of hazardous wastes per month are subject to the Small Quantiy Generator regulations. These regulations will require waste producing facility to:

1) Identify the hazardous wastes produced.

2) Obtain an EPA identification number.

3) Ship hazardous wastes for treatment, storage, or disposal in EPA approved facilities. The shipment will have to meet the requirements set by the Federal Department of Transportation for hazardous wastes. In addition the shipment will have to be accompanied by a manifest containing the generator's name and address, the shippers name, and the name and address of the receiving facility.

4) The hazardous wastes should be offered, at least every 180 days, to shippers and disposal facilities with an EPA identification number. In Alaska, because there are no EPA certified hazardous waste disposal sites within 200 miles, the wastes can be stored for 270 days. The maximum weight of the wastes being stored, however, cannot exceed 13,200 pounds.

5) Finally, the waste generator should keep a copy of the shipping manifest for three years.

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98101

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WASTE MANAGEMENT BRANCH

REPLY TO
ATTN OF M/S 530

David Wigglesworth
Alaska Health Project
417 W Eighth Avenue
Anchorage, Alaska 99501

Dear Mr. Wigglesworth:

This is in reply to your question regarding information required by the Alaska Health Project's small quantity generator study. The purpose of this project is to study general waste management procedures and processes for specific small quantity generator categories. We hope to identify common current waste practices that can be better managed, and/or methods where waste generation can be minimized.

Because we wish the study results and recomendations to be as widely applicable to other generators as possible, we would like to obtain information which characterizes the representative generators you are studying. We do not feel any facility-specific identifiers will be necessary, but we would like any information on the facility type, process, size of operation, and/or any other information which would have bearing on the usefulness or extrapolation of the data to other generators, both in and outside of Alaska.

If you have further questions, please feel free to contact me.

Sincerely,

Joan Cabreza
RCRA Program Development